

Generic placement of the African flea beetle *Polyclada maculipennis* Bryant and the possible occurrence of the genus *Procalus* Clark in sub-Saharan Africa (Coleoptera, Chrysomelidae, Galerucinae, Alticini)

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Abstract

Polyclada Chevrolat and *Procalus* Clark are flea beetle genera (Coleoptera, Chrysomelidae, Galerucinae, Alticini). *Polyclada* is endemic to the Afrotropical region, while *Procalus* has never been described outside of the Neotropical region. The new combination *Procalus maculipennis* (Bryant, 1942), **comb. nov.** is proposed for *Polyclada maculipennis* Bryant, 1942. Its plausible type locality is Venezuela, and not Cameroon, as recorded on the labels of the type material, and hence the occurrence of *P. maculipennis* in Africa is questionable.

Keywords

Afrotropical region, Neotropical region, taxonomy, new combination, lectotype designation

Introduction

Polyclada Chevrolat, 1836 is an Afrotropical flea beetle genus occurring in sub-Saharan Africa, Saudi Arabia, and Yemen. It comprises 16 described species currently under revision (Biondi and D'Alessandro 2010, 2012; Biondi et al. 2022). The genus

is associated with Anacardiaceae (*Sclerocarya birrea* (A. Rich) Hochst.) and Burseraceae (*Commiphora* spp.), in a variety of woodland and savannah ecosystems (Chaboo et al. 2007; Iannella et al. 2021). *Polyclada* is one of the five Afrotropical genera belonging to the *Blepharida*-group *sensu* Furth and Lee (2000) and Prathapan and Chaboo (2011), along with *Diamphidia* Gerstaecker, *Xanthophysca* Fairmaire, and the recently re-evaluated *Blepharidina* Bechyné and *Calotheca* Heyden (Biondi et al. 2017, 2019; D'Alessandro et al. 2018, 2019, 2020, 2021). The *Blepharida*-group currently comprises 21 genera from the Afrotropical, Nearctic, Neotropical, and Oriental regions (Medvedev 1999; Furth and Lee 2000; Prathapan and Chaboo 2011; Biondi et al. 2017). Furth and Lee (2000) provided a morphological synthesis of the group based on adult characters (tarsal claws, procoxal cavities, head, pronotum, hind femora, eye, proepimeron, and metatibia) and larval characters (antenna, mandible, labrum, stemmata, endocarina, coronal suture, and frontal suture). However, some characters are shared by most (but not all) of the genera (Furth and Lee 2000), and a more comprehensive analysis based on the whole set of genera and representative species is badly needed to more rigorously test the monophyly of the group.

During revisionary studies of the genus *Polyclada*, we examined the type material of *P. maculipennis* Bryant, 1942, in the general collection of the Natural History Museum in London (NHMUK) and noticed that it belongs to the Neotropical genus *Procalus* Clark, 1865. Bryant (1942) based the description of this species on three specimens from Cameroon and believed it to be allied to *Polyclada bohemani* (Baly, 1861).

Procalus comprises an unknown number of species, but including *P. mutans* (Blanchard, 1851), *P. viridis* (Philippi & Philippi, 1864), *P. lenzi* (Harold, 1876), *P. reduplicatus* Bechyné, 1951, *P. malaisei* Bechyné, 1951, and *P. silvai* Jerez, 1995 (Jerez 1992, 1995). Three more species were reported by Artigas and Solar (2015): *P. artigasi* Jerez, *P. ortizi* Jerez, and *P. vilosensis* Jerez, which are also cited by other authors (Jerez 2003; Prathapan and Chaboo 2011). However, they were described in an unpublished doctoral thesis (Jerez 1999a, cited by Jerez 2003), therefore, according to Article 9.12 of the International Code of Zoological Nomenclature (ICZN 2020), these three names cannot be considered as available.

In this paper, we revise the taxonomic status of *Polyclada maculipennis* and discuss the possible occurrence of the genus *Procalus* in sub-Saharan Africa.

Materials and methods

Examined material consisted of dried, pinned specimens preserved in the institutions listed below. The specimens were examined and dissected under a Leica M205C stereomicroscope. Photographs were taken using a Leica DMC5400 camera and were compiled using Zerene Stacker v. 1.04. Scanning electron micrographs were taken using a Hitachi TM-1000. Abbreviations of the depositories follow Evenhuis (2022).

Depositories

BAQ	collection of M. Biondi, University of L'Aquila, Italy;
MSNG	Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy;
NHMB	Naturhistorisches Museum, Basel, Switzerland;
NHMUK	The Natural History Museum, London, United Kingdom;
NMPC	National Museum (Natural History), Prague, Czech Republic.

Results

Procalus maculipennis (Bryant, 1942), **comb. nov.**

Figs 1–3, 5–8

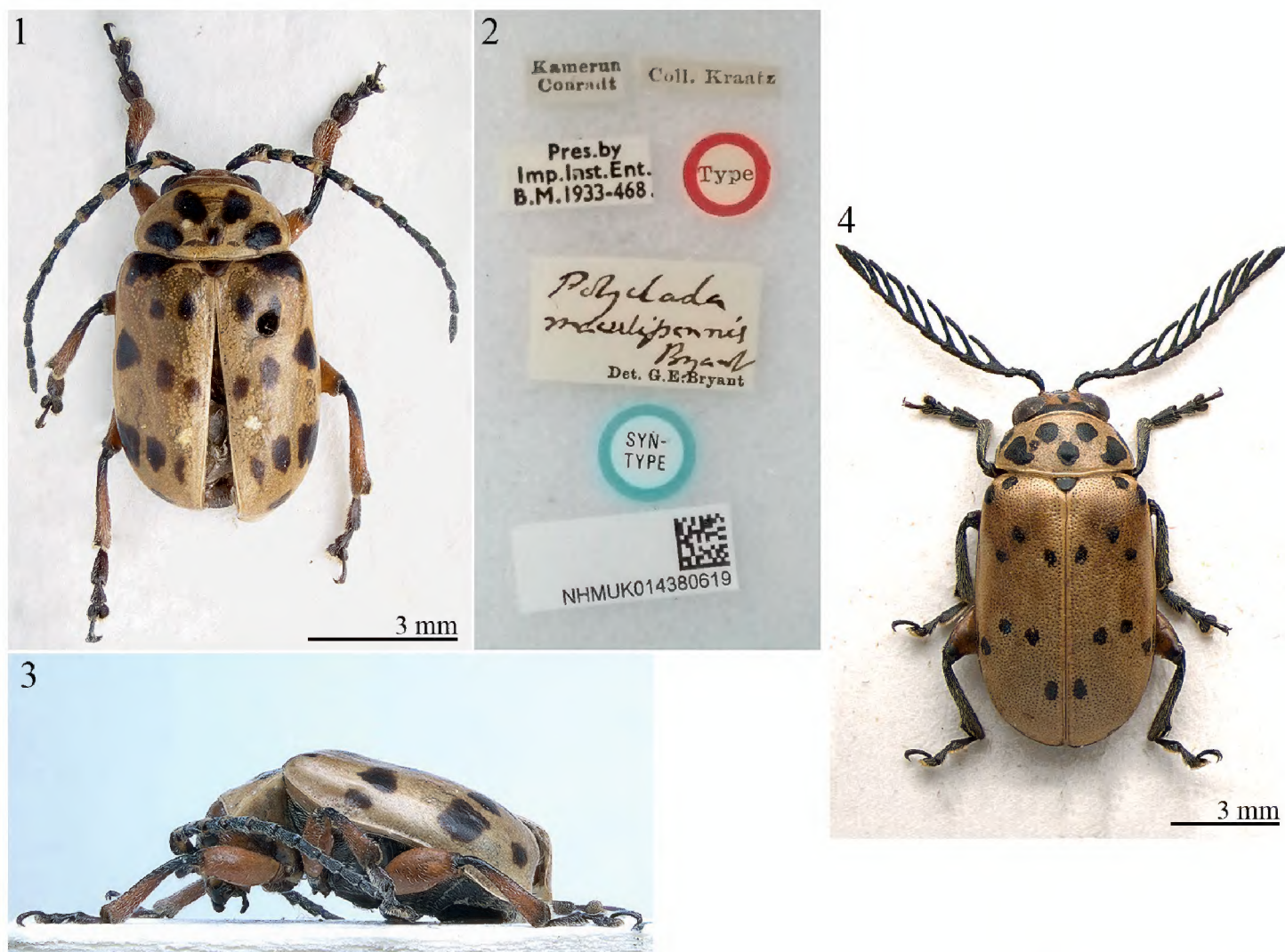
Polyclada maculipennis Bryant, 1942: 164.

Type material examined. Lectotype of *Polyclada maculipennis* ♂: "Kamerun Conradt // Coll. Kraatz // Pres. By Imp. Inst. Ent. B.N. 1933-468 // *Polyclada maculipennis* Bryant / Det. G.E. Bryant" (NHMUK) (here designated by M. Biondi and P. D'Alessandro) (Figs 1–3). Paralectotypes of *Polyclada maculipennis*, 2 ♀♀: same data as for lectotype (NHMUK).

Material of *Procalus* species examined for comparison. Chile: *Procalus reduplicatus*, syntype, 1 ♀, "Chile // Coll. Nickerl / Mus. Pragense // *Procalus mutans* Blchd. // Typus // *Procalus reduplicatus* n. sp. Type ♀ / 1948 Det. J. Bechyně" (NMPC); *Procalus* cf. *viridis*, 1 specimen, El Tabo, Valparaíso, 29 Sept. 1986 (NHMB); *Procalus* cf. *lenzi*, 1 specimen, Santiago, Pudahuel, 20 Nov. 1986 (NHMB); *Procalus* cf. *malaisei*, 2 specimens, D. Ed. Varas Arangua leg., 1921 (MSNG); *Procalus* cf. *lenzi*, 1 specimen, ibid (MSNG); *Procalus* cf. *viridis*, 1 specimen, Viña del Mar, Valparaíso, May 1899, F. Silvestri leg. (MSNG); *Procalus* cf. *silvai*, 1 specimen, Concepción, 1903, P. Herbst leg. (MSNG); *Procalus* cf. *reduplicatus*, 1 specimen, ibid (MSNG); *Procalus* cf. *mutans*, 1 specimen, Concepción, Sept. 1903, P. Herbst leg. (MSNG); *Procalus* sp., 2 specimens, ibid (MSNG); *Procalus* cf. *reduplicatus*, 1 specimen, Concepción, 1904, P. Herbst leg. (MSNG); *Procalus* sp., 1 specimen, ibid (MSNG).

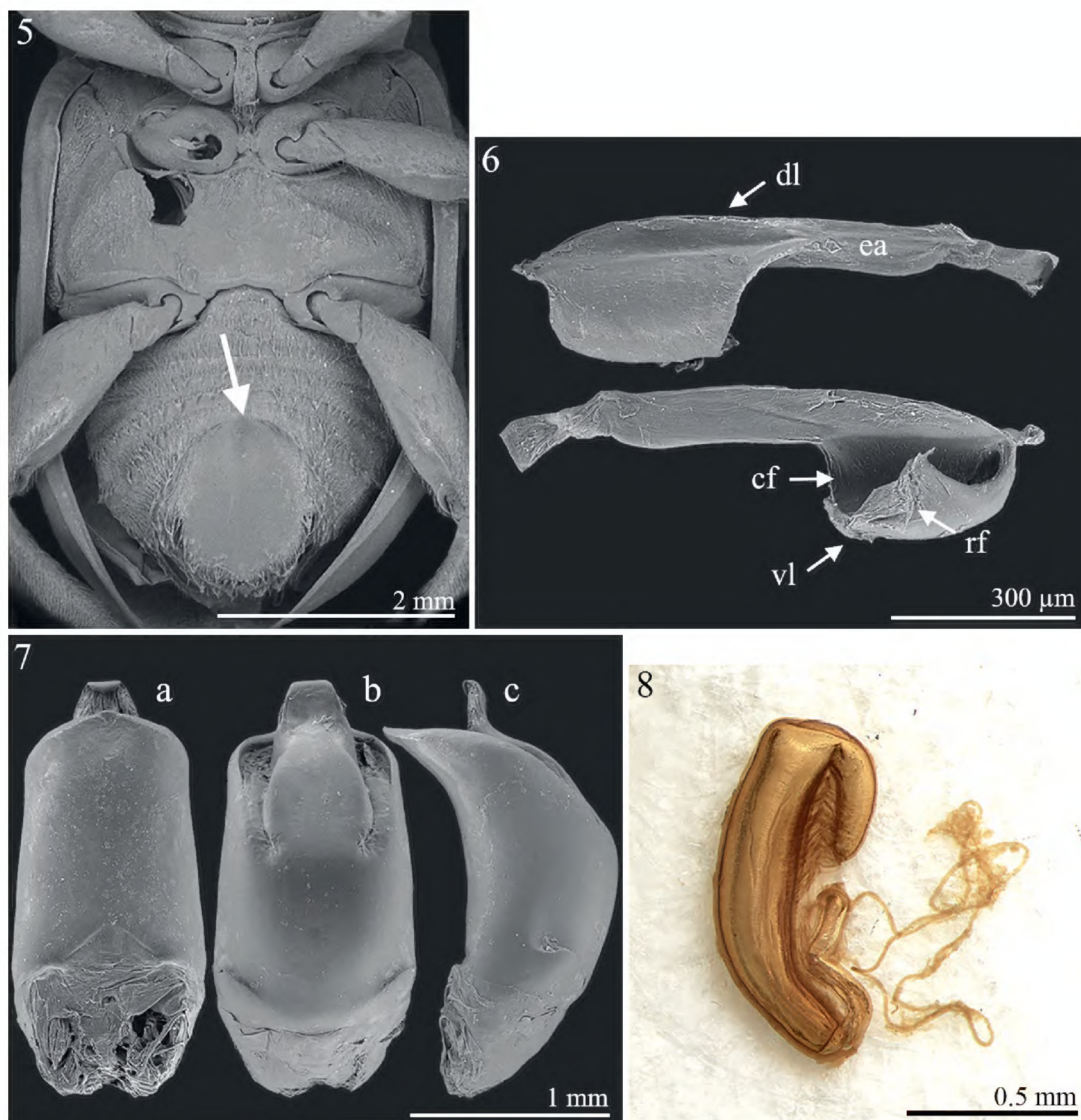
Remarks. *Polyclada* can be immediately distinguished from similar genera by the antennae, longer than half body length, with antennomeres 4–10 pectinate or flabellate in male and serrate in female (Fig. 4). Characters of the antenna along with other morphological features, such as procoxal cavities open posteriorly, antennomere 4 at least double length of antennomere 3, as well as elytral punctation always confused, densely and uniformly impressed, permits identification of the genus within the *Blepharida* group in the Afrotropical region (Biondi and D'Alessandro 2012; Biondi et al. 2017).

The type material of *Polyclada maculipennis* has all the diagnostic characters of *Procalus* (Clark 1865; Jerez 1992), none of which occur in any *Polyclada* species: antennae



Figures 1–4. Lectotype of *Polyclada maculipennis* Bryant, 1942 **1** habitus, dorsal view **2** ibid., labels **3** ibid., habitus, lateral view **4** *Polyclada bohemani* Baly, male, Kenya (BAQ), habitus.

with antennomeres 1–5 flattened compared to 6–11, especially in male, and antennomere 1 clearly distally enlarged, and strikingly serrated in male (Fig. 1; Clark 1865; Jerez 1992: figs 4A, 5A, 6A, 7A, 8A, 1995: figs 1, 2); fifth abdominal sternite in male with a wide, deep, oval depression (Fig. 5; Jerez 1992: figs 5E, 6D, 7C, 8F, 1995: fig. 2); metafemoral extensor tendon simplified, very slender (Fig. 6; Furth and Suzuki 1994: fig. 6b; Jerez 1992: figs 2, 3D); dorsal lobe straight, with very elongate extended arm; central furrow very wide; ventral lobe subtriangular; recurved flange short, poorly sclerotized. Additionally, the median lobe of aedeagus and spermatheca (Figs 7, 8) are typical of the *Procalus* species (median lobe of aedeagus: Furth and Suzuki 1994: fig. 6a; Jerez 1992: figs 4E, 5C, 6E, 7B, 8G, 1995: fig. 10; spermatheca: Furth and Suzuki 1994: fig. 6c; Jerez 1992: figs 4D, 5D, 6B, 7D, 8E, 1995: fig. 11). Median lobe of the aedeagus of the lectotype here designated (Fig. 7): thickset and smooth; in ventral view tapering towards the apex, and slightly narrowing subapically; apex subtriangular, widely obtuse, with a small median tooth; in lateral view, clearly curved. Spermatheca of the paralectotypes (Fig. 8): subcylindrical and elongate basally, curved towards the ductus attachment; distal part distinctly bent and about 1/3 the basal part in length; ductus basally inserted, short, uncoiled, moderately thickset. We therefore propose the new combination *Procalus maculipennis* (Bryant, 1942), comb. nov.



Figures 5–8. *Procalus maculipennis* Bryant, 1942 comb. nov. **5** ventral parts in male **6** metafemoral extensor tendon **7** median lobe of aedeagus in ventral, dorsal, and lateral views (**a–c**, respectively) **8** spermatheca. Abbreviations: cf: central furrow; dl: dorsal lobe; ea: extended arm; rf: recurved flange; vl: ventral lobe.

Discussion

Clark (1865) reported the genus *Procalus* as abundant and widely distributed in Chile, and also present in Brazil and Bolivia. Based on Scherer (1983), this genus occurs in Chile, Bolivia, Brazil, and Argentina. Jerez (1992, 1995) considered *Procalus* as occurring only in Chile, based on her examined material. Later, she (Jerez 1999b) stated that, based on both public and personal collections, the genus is distributed between latitudes of 30°50'S and 40°50'S, and cited undetermined *Procalus* material from southern Argentina preserved in the Museum National d'Histoire Naturelle de Paris. Endemic to Chile or not, it has never been described outside of the Neotropical region.

What about *Procalus maculipennis* comb. nov. from Cameroon? We can only speculate about some different hypotheses. Hypothesis A: the genus *Procalus* has a Gondwanan distribution, even though it is dramatically more abundant in the Neotropical region. The Gondwanan distributions of terrestrial taxa generally refer to genera with clearly differentiated species, or higher taxa (cf. Gómez-Zurita and Cardoso 2021). Among flea beetles, the genera with Afrotropical–Neotropical disjunct distributions occur in the two regions with clearly differentiated species: *Terpnochlorus* Fairmaire from the Afrotropical region, Venezuela, and Mexico, and, if the synonymy is confirmed, the Malagasy *Abrarius* Fairmaire, is possibly a senior synonym of *Gioia* Bechyné from South America (Biondi and D'Alessandro 2012). A second Afrotropical–Neotropical disjunct distribution is observed at a higher taxonomic level; for example, *Zomba* Bryant is the only representative of the subtribe Monoplatina in the Afrotropical region. This subtribe occurs almost exclusively in the Neotropical and southern part of the Nearctic regions and is present in the Australian region only with the genus *Opisthopygme* Blackburn, 1896. Based on the diagnostic characters reported by Jerez (1992), *Procalus maculipennis* comb. nov. is so similar to *P. reduplicatus* Bechyné that one could evaluate to establish a synonymy in a possible future revision of the genus. For Hypothesis A to be true, these two taxa would have remained so similar despite approximately 135 million years of independent evolution (cf. Donateli Gatti et al. 2021), even though the diversification of *Procalus* in South America occurred in a much shorter time, likely during the Pliocene (Jerez 1999b). Hypothesis B: the species was imported to Africa via host plants. *Procalus* species are associated with *Lithraea* Miers ex Hook. & Arn. and *Schinus* L. (Anacardiaceae) (Jerez 1992, 1999b). The genus *Lithrea*, native to South America, is reported as introduced only in California and Tunisia, not in Cameroon or other sub-Saharan countries (POWO 2021). *Schinus* is also native to South America, is used ornamentally around the world, and was imported into several African countries, but not into Cameroon and adjacent areas (POWO 2021).

Hypothesis C: the types are mislabelled. Starting from the assumption that Leopold Conradt was the collector, it is possible that the entomological material he collected or somehow acquired in Venezuela (where he stayed for some time before 1889) was brought to Cameroon, where he subsequently collected in 1896 (Rohlfien 1975). In fact, material from Venezuela reached the Deutschen Entomologischen Instituts—now Senckenberg Deutsches Entomologisches Institut (SDEI)—via Gustav Kraatz in 1905 along with material from Togo and Cameroon (Rohlfien 1975). It is plausible that the samples from Venezuela were mixed up with, and then erroneously labelled as being from Cameroon. A similar interpretation about the putative and unlikely disjunct distributions of some Hymenoptera species have been offered by Liston et al. (2017). Similarly, Furth (1998) highlighted that *Blepharida semisulcata* Achard originally described from Cayenne (French Guiana) is a mislabelled specimen from the Afrotropical Region. For us, this is the most plausible hypothesis to explain the alleged presence of *Procalus* in Africa. However, fieldwork in Cameroon and Venezuela in search of the original habitat and host plants of *Procalus maculipennis* comb. nov. can put the issue to rest.

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References

- Artigas JN, Solar ES (2015) Catálogo de los tipos depositados en las colecciones zoológicas de la Universidad de Concepción (MZUC-UCCC) entre diciembre de 1992 y agosto de 2015. *Gayana (Concepción)* 79(2): 173–207. <https://doi.org/10.4067/S0717-65382015000200008>
- Baly JS (1861) Descriptions of new genera and species of *Phytophaga*. *Journal of Entomology* 1: 193–206. <https://doi.org/10.1111/j.1365-2311.1875.tb01898.x>
- Bechyné J (1951) Chrysomeloidea américains nouveaux ou peu connus. *Revista Chilena de Entomología* 1: 75–112. <https://www.biodiversitylibrary.org/item/100308>
- Biondi M, D'Alessandro P (2010) Genus-group names of Afrotropical flea beetles (Coleoptera: Chrysomelidae: Alticinae): Annotated catalogue and biogeographical notes. *European Journal of Entomology* 107(3): 401–424. <https://doi.org/10.14411/eje.2010.049>
- Biondi M, D'Alessandro P (2012) Afrotropical flea beetle genera: A key to their identification, updated catalogue and biogeographical analysis (Coleoptera, Chrysomelidae, Galerucinae, Alticini). *ZooKeys* 253: 1–158. <https://doi.org/10.3897/zookeys.253.3414>
- Biondi M, Frasca R, Grobbelaar E, D'Alessandro P (2017) Supraspecific taxonomy of the flea beetle genus *Blepharida* Chevrolat, 1836 (Coleoptera: Chrysomelidae) in the Afrotropical Region and description of *Afroblepharida* subgen. nov. *Insect Systematics & Evolution* 48(2): 97–155. <https://doi.org/10.1163/1876312X-48022152>
- Biondi M, Iannella M, D'Alessandro P (2019) Unravelling the taxonomic assessment of an interesting new species from Socotra Island: *Blepharidina socotrana* sp. nov. (Coleoptera: Chrysomelidae). *Acta Entomologica Musei Nationalis Pragae* 59(2): 499–505. <https://doi.org/10.2478/aemnp-2019-0040>
- Biondi M, D'Alessandro P, Cerasoli F, De Simone W, Iannella M (2022) Taxonomy, habitat preference, and niche overlap of two arrow-poison flea beetle species of the genus *Polyclada* in Sub-Saharan Africa (Coleoptera, Chrysomelidae). *Insects* 13(8): e668. <https://doi.org/10.3390/insects13080668>
- Blackburn T (1896) Further notes on Australian Coleoptera, with description of new genera and species. *Transactions of the Royal Society of South Australia* 20: 35–109. <https://www.biodiversitylibrary.org/item/84661>
- Blanchard E (1851) Fauna Chilena. Insectos Coleópteros. In: Gay C (Ed.) *Historia Física y Política de Chile. Zoologica*. Tomo Quinto. Museo de historia natural de Santiago & En casa del autor, Chile & Paris, 564 pp. <https://doi.org/10.5962/bhl.title.16172>

- Bryant GE (1942) New species of *Polyclada* (Coleoptera, Halticinae) from Africa. Proceedings of the Royal Entomological Society of London (B) 11(11): 161–165. <https://doi.org/10.1111/j.1365-3113.1942.tb00716.x>
- Chaboo CS, Grobbelaar E, Larsen A (2007) Fecal ecology in leaf beetles: novel records in the African arrow-poison beetles, *Diaphidina* Gerstaecker and *Polyclada* Chevrolat (Chrysomelidae: Galerucinae). Coleopterists Bulletin 61(2): 297–309. [https://doi.org/10.1649/0010-065X\(2007\)61\[297:FEILBN\]2.0.CO;2](https://doi.org/10.1649/0010-065X(2007)61[297:FEILBN]2.0.CO;2)
- Chevrolat LAA (1836) Chrysomelidae. In: Dejean PFMA (Ed.) Catalogue des coléoptères de collection de M. le Comte Dejean. Librairie Méquignon-Marvis Père et Fils, Paris, 563 pp. <https://doi.org/10.5962/t.173109>
- Clark H (1865) An examination of the Dejeanian genus *Coelomera* (Coleoptera-Phytophaga) and its affinities. The Annals and Magazine of Natural History (Series 3) 16: 256–268. <https://doi.org/10.1080/00222936508679421>
- D'Alessandro P, Frasca R, Grobbelaar E, Iannella M, Biondi M (2018) Systematics and biogeography of the Afrotropical flea beetle subgenus *Blepharidina* (*Afroblepharida*) Biondi & D'Alessandro, with description of seven new species (Coleoptera, Chrysomelidae, Galerucinae, Alticini). Insect Systematics & Evolution 49(5): 443–480. <https://doi.org/10.1163/1876312X-00002182>
- D'Alessandro P, Iannella M, Biondi M (2019) Revision of the Afrotropical flea beetle subgenus *Blepharidina* s. str. Bechyné (Coleoptera, Chrysomelidae). Zootaxa 4545(1): 32–60. <https://doi.org/10.11646/zootaxa.4545.1.2>
- D'Alessandro P, Iannella M, Grobbelaar E, Biondi M (2020) Revision of the *Calotheca nigrotesellata* species group from southern Africa, with description of two new species (Coleoptera: Chrysomelidae, Galerucinae, Alticini). Fragmenta Entomologica 52(2): 169–182. <https://doi.org/10.4081/fe.2020.457>
- D'Alessandro P, Iannella M, Grobbelaar E, Biondi M (2021) Taxonomic revision of the *Calotheca parvula* species group from southern Africa, with descriptions of three new species (Coleoptera, Chrysomelidae). African Invertebrates 62(1): 315–337. <https://doi.org/10.3897/AfrInvertebr.62.62426>
- Donateli Gatti F, Falcão Salles F, Suter PJ, Reis Leite YL (2021) Gondwana breakup under the ephemeral look. Journal of Zoological Systematics and Evolutionary Research 59(5): 1028–1036. <https://doi.org/10.1111/jzs.12477>
- Evenhuis NL (2022) The insect and spider collections of the world website. <http://hbs.bishop-museum.org/codens/> [Accessed on 2022.6.16]
- Furth DG (1998) New World *Blepharida* Chevrolat 1836 (Coleoptera: Chrysomelidae: Alticinae). Memoirs of the Entomological Society of Washington 21: 1–109.
- Furth DG, Lee JE (2000) Similarity of the *Blepharida*-group genera using larval and adult characters (Coleoptera: Chrysomelidae: Alticinae). Journal of the New York Entomological Society 108(1 & 2): 26–51. [https://doi.org/10.1664/0028-7199\(2000\)108\[0026:SOTBGG\]2.0.CO;2](https://doi.org/10.1664/0028-7199(2000)108[0026:SOTBGG]2.0.CO;2)
- Furth DG, Suzuki K (1994) Character correlation studies of problematic genera of Alticinae in relation to Galerucinae (Coleoptera: Chrysomelidae). In: Furth DG (Ed.) Proceedings of the Third International Symposium on the Chrysomelidae, Beijing, 1992. Backhuys Publishers, Leiden, 116–135.

- Gómez-Zurita J, Cardoso A (2021) Molecular systematics, higher-rank classification and Gondwanan origins of Cryptocephalinae leaf beetles. *Zoologica Scripta* 50(5): 592–615. <https://doi.org/10.1111/zsc.12501>
- Harold von EF (1876) VI. Diagnosen Neuer Arten. *Coleopterologische* (15): 118–124.
- Iannella M, D'Alessandro P, De Simone W, Biondi M (2021) Habitat specificity, host plants and areas of endemism for the genera-group *Blepharida* s.l. in the Afrotropical region (Coleoptera, Chrysomelidae, Galerucinae, Alticini). *Insects* 12(4): e299. <https://doi.org/10.3390/insects12040299>
- ICZN (2020) International Code of Zoological Nomenclature (Online). <https://www.iczn.org/the-code/the-code-online/> [Accessed on 2022.6.16]
- Jerez V (1992) Revision taxonomica del genero *Procalus* Clark, 1865 (Chrysomelidae – Alticinae). *Gayana. Zoología* 56(3–4): 109–125. <http://www.biodiversitylibrary.org/item/89079>
- Jerez V (1995) *Procalus silvai*, n. sp. description and interaction with *Schinus patagonicus* (Chrysomelidae – Alticinae). *Gayana. Zoología* 59(2): 161–165. <https://www.biodiversitylibrary.org/item/89068>
- Jerez V (1999a) Filogenia y Biogeografía del Género *Procalus* Clark, 1865 (Coleoptera – Chrysomelidae) y su relación con Anacardiaceae. PhD thesis. Universidad de Concepción, Chile.
- Jerez V (1999b) Biology and ecology of the genus *Procalus* Clark, 1865, endemic to the Andinopatagonian region (Alticinae). In: Cox ML (Ed.) *Advances in Chrysomelidae Biology* 1. Backhuys Publishers, Leiden, 545–555.
- Jerez V (2003) Interspecific differentiation in eggs and first instar larvae in the genus *Procalus* Clark 1865 (Chrysomelidae: Alticinae). In: Furth DG (Ed.) *Special Topics in Leaf Beetle Biology: Proceedings of the Fifth International Symposium on the Chrysomelidae, XXI International Congress of Entomology, 25–27 August 2000, Iguassu Falls, Brazil*. Pensoft Publisher, Sofia & Moscow, 147–153.
- Liston AD, Goergen G, Koch F (2017) Revisions of the Afrotropical genera of Argidae and species of *Pampsilota* Konow, 1899 (Hymenoptera, Tenthredinoidea). *Deutsche Entomologische Zeitschrift* 64(1): 1–25. <https://doi.org/10.3897/dez.64.10800>
- Medvedev LN (1999) A revision of the group Blepharidiini (Chrysomelidae: Alticinae) from the Oriental region. *Russian Entomological Journal* 8: 175–184.
- Philippi RA, Philippi F (1864) Beschreibung einiger neuen Chilenischen Käfer. *Entomologische Zeitung* 25(10–12): 313–406. <https://www.biodiversitylibrary.org/item/35935>
- POWO (2021) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. <https://powo.science.kew.org/> [Accessed on 2022.6.16]
- Prathapan KD, Chaboo CS (2011) Biology of *Blepharida*-group flea beetles with first notes on natural history of *Podontia congregata* Baly, 1865 an endemic flea beetle from southern India (Coleoptera, Chrysomelidae, Galerucinae, Alticini). *ZooKeys* 157: 95–130. <https://doi.org/10.3897/zookeys.157.1472>
- Rohlfien K (1975) Aus der Geschichte der entomologischen Sammlungen des ehemaligen Deutschen Entomologischen Instituts. I. Allgemeiner Teil, II. Die Dipterensammlung. *Beiträge zur Entomologie* 25(2): 261–296. <https://doi.org/10.21248/contrib.entomol.25.2.261-296>
- Scherer G (1983) Diagnostic key for the Neotropical alticine genera. *Entomologische Arbeiten aus dem Museum G. Frey* 31–32: 1–89. <https://www.biodiversitylibrary.org/item/173329>